

## CHAPTER 700 MISCELLANEOUS STANDARDS

### Topic 701 - Fences

#### Index 701.1 - Policy and Purpose of Fences

- (1) *Policy.* The type and location of fences should be as described herein and in the Standard Plans and Specifications, except in special situations for which provision is made below.
- (2) *Purpose of Fences.*
  - (a) Fences on freeway and expressways are State-owned facilities placed within the right of way to help enforce observance of the acquired access rights.
  - (b) Fences on other highways are privately owned facilities along the right of way line which primarily serve the abutting property owners' needs.
  - (c) Median fences are constructed to help prevent indiscriminate crossings of the median by vehicles or pedestrians.
- (3) *Approval.* The District Director has the authority and responsibility for approval of fence type and location within the policies stated herein.

#### 701.2 Fences on Freeways and Expressways

- (1) *Policy.* **Fences shall be provided on freeways and expressways to control access (except as otherwise provided under paragraph (3)(e)).** Freeway fencing or equivalent access control should extend to the limit of the legal access control on local streets at ramp termini.
- (2) *Standard Fence Types.* The standard types of freeway fence are:
  - (a) Chain Link Fencing--Type CL-1.8 fence or equivalent access control should be used along the right of way and in the outer separation in urban or developed areas.

- (b) Other Fencing--In rural areas, fences on freeways normally should be either Type BW or Type WM on either wood or metal posts. Wood posts may be more aesthetic than metal posts, depending on the surrounding terrain.
  - (c) Median Fencing--Type CL-1.2 fence, raised 150 mm above the ground, should be used where median fencing is required (see Index 701.1(2)).
- (3) *Exceptions to Standard Fence Types.*
    - (a) If walls or fences equal to or better than the standard fence in durability, maintenance requirements, and dimensions exist along the right of way line, the standard fence may be omitted or removed. To avoid a gap in the access control, standard fences should be securely joined to the existing fence or wall at its terminals, if the access control line extends beyond these points.
    - (b) Fences of special design may be installed where needed for wild animal control.
    - (c) While standard fences are generally equal to or better than those normally constructed by ranchers for the control of their stock, construction of a different type of fence for this purpose may be appropriate in special cases. The property owner is required to pay any extra cost incurred unless the more costly fence is intended to:
      - Match that by which the balance of the property is enclosed.
      - Benefit the public.
      - Be part of the consideration paid for the right of way.
    - (d) In special cases, where improvements are scattered, the area is aesthetically sensitive, and a lower fence would be in keeping with the height of adjacent property fence, a Type CL-1.2 fence may be substituted for Type CL-1.8 along the right of way in locations where Type CL-1.8 would otherwise be used.

- (e) Fencing may be omitted in remote areas where access control appears unnecessary.
- (f) In special cases, nonstandard fencing may be considered at freeway ramp terminals on local streets when the adjacent property either is, or is proposed to be, developed in such a way that the owner feels that standard fencing is aesthetically objectionable. If it is concluded that the objection is valid, a more compatible facility may be substituted, subject to the following controls:
  - Preference should be given to retaining the standard fence along the ramp to the end of the curb return or beginning of the taper on the local road. Where this is not reasonable, there may be substituted a fence or wall of equal or better durability and utility that is at least 1.2 m high relative to the grade of freeway right of way line. Walls, ornamental iron fences with closely spaced members, or chain link fences are examples of acceptable possibilities.
  - Along the local road, beyond the end of the curb return or the beginning of the taper, a facility of somewhat lower standards may be employed, if considered appropriate. The minimum allowable height is 0.8 m above the grade at the edge of the right of way. In addition to the fence types suitable for use along the ramp, split rail fences, wooden picket fences, and permanent planter boxes are examples of possibilities. The intent is to delineate the access control line and discourage access violations in an effective manner.
  - Generally, all costs for the removal of the existing freeway fence and the installation and future maintenance of a nonstandard fence are to be the property owner's responsibility under the terms of the encroachment permit

authorizing the substitution. On new construction, the property owner is to assume similar costs and responsibilities subject to a credit for the value of a standard fence.

- (4) *Location of Fences.* Normally, fences on freeways should be placed adjacent to, but on the freeway side of the right of way line.

Fences in the outer separation normally should be placed as shown in Figure 307.4 so that the area outside of the fence may be relinquished to the local agency.

When viewed at a flat angle, chain link fencing restricts sight distance. This fact should be considered in the location of such fencing at intersections. To eliminate hand maintenance, right-angle jogs should be avoided.

- (5) *Locked Gates.* Locked gates may be provided in access control fences in special situations. The criterion should be necessity and not desirability. Although openings controlled by locked gates do not constitute access openings in the usual sense of access control, they must be included in the plans. Where locked gates are provided in the plans, each gate must be fully justified by specific reasons stated in the "General Features" section of the PS&E report. In addition, a statement is required as to who will hold the keys to each gate. Locked gates fall into two categories:

- (a) Locked gates to be used exclusively by highway maintenance forces do not require FHWA approval and may be approved by the District Director if integrity of access is assured during construction in existing access fences, maintenance forces keep gates locked when not in actual use by person or equipment, and one or more of the following criteria apply:
  - Circuitous routes would be eliminated.
  - Parking on the freeway which may expose maintenance workers to freeway traffic and parking is

available or can be developed near the gate.

- Slow moving equipment could be kept off the freeway.
- Site not accessible to equipment from the freeway.
- Gates necessary for access to facilities outside the freeway right of way that cannot be reached from local streets or roads.

- (b) Proposals for locked gates to be used by other public agencies or utility companies must be submitted to the Chief, Division of Design for approval. The submittal should give all the facts justifying approval and comparisons with alternate solutions.

Criteria for justification are generally the same as for gates used exclusively by highway maintenance forces except for parking. Safe and adequate parking is a necessary part of the solution to access by other agencies.

Locked gates to be used by non-utility entities require FHWA approval under any of the following circumstances:

- The gate is on an Interstate route.
- Federal-aid funds participated in the cost of right of way.
- Federal-aid funds participated or may participate in the cost of construction.

When proposals for locked gates requiring FHWA approval are included in the plans for new construction, including landscaping projects, FHWA approval of such gates will be included in FHWA approval of the project PS&E. Subsequent installations requiring FHWA approval will be submitted separately to FHWA by the Division of Design after approval by the Chief, Division of Design.

### 701.3 Fences on Other Highways

- (1) *Policy.* The State will construct or pay the cost of fences on private property only as a right of way consideration to mitigate damages. State construction of such fences should be limited to:

- (a) The reconstruction or replacement of existing fences.
- (b) The construction of fences across property that had been previously enclosed by fences.

This policy applies to all private as well as public lands.

- (2) *Types of Fences.* Only Type BW and Type WM fences on either metal or wood posts are to be constructed by the State on highways other than freeways and expressways.
- (3) *Location of Fences.* Fences on other highways are placed along the right of way line inside the abutting property.

## Topic 702 - Miscellaneous Traffic Items

### 702.1 References

- (1) *Guardrail and Crash Cushions.* See Chapter 7 of the Traffic Manual.
- (2) *Markers.* See Chapter 6 of the Traffic Manual.
- (3) *Truck Escape Ramps.* See Traffic Bulletin No. 24, 1986 and NCHRP Report 178.
- (4) *Mailboxes.* See "A Guide for Erecting Mailboxes on Highways," 1994, published by AASHTO.

## Topic 703 - Special Structures and Installation

### 703.1 Truck Weighing Facilities

The Traffic Operations Program is responsible for coordination of design and construction activities for truck weighing facilities with the California

Highway Patrol in Sacramento. Typical plans showing geometric details of these facilities are available from the Traffic Operations Program. The District should refer maintenance issues on truck weighing facilities to the District maintenance units.

See Index 107.1 for additional details on roadway connections for truck weighing facilities.

### **703.2 Rockfall Restraining Nets**

Rockfall Restraining Nets are protective devices designed to control large rockfall events and prevent rock from reaching the traveled way. The systems consist of rectangular panels of woven wire rope vertically supported by steel posts and designed with frictional brake elements capable of absorbing and dissipating high energies. For additional information on the characteristics and applications for rockfall restraining nets, designers should contact the Office of Structural Foundations.

## **Topic 704 - Contrast Treatment**

### **704.1 Policy**

In general, delineation should be composed of the standard patterns discussed under Chapter 6, Markings, of the Traffic Manual.

Markings include lines and markings applied to the pavement, raised pavement markers, delineators, object markers, and special pavement treatments.

Contrast treatment is designed primarily to provide a black color contrast with an adjacent white surface. Normally, contrast treatment should be used only in special cases such as the following:

- (a) To provide continuity of surface texture for the guidance of drivers through construction areas.
- (b) To provide added emphasis on an existing facility where driver behavior has demonstrated that standard signs and markings have proven inadequate.

When contrast treatment is applied, a slurry seal should be used.

See Chapter 6 of the Traffic Manual for additional information on contrast treatment.

## **Topic 705 - Materials and Color Selection**

### **705.1 Special Treatments and Materials**

Special materials or treatments, such as painted concrete, or vinyl-clad fences, are sometimes proposed for aesthetic reasons, or to comply with special requirements.

The following guidelines are to be used for the selection of these items:

- (a) Concrete should not be painted unless exceptional circumstances exist, due to the continuing and expensive maintenance required. Concrete subject to staining should be textured during construction to minimize the appearance of the stains, if other methods of controlling stain-producing runoff or dripping cannot be accomplished.
- (b) Vinyl-clad fences are sometimes specified for aesthetic reasons. The cost of this material is considerably higher than that of galvanized steel. The use of 0.9 m high black vinyl-clad mesh for safety fencing at the top of retaining walls and pedestrian overcrossing fencing is acceptable.

### **705.2 Colors for Steel Structures**

Colors for steel bridges and steel sign structures are limited to aluminum, green, gray, or neutral tones of brown, tan, or light blue, unless local requirements dictate otherwise.

Criteria for selection of colors are:

- (a) General continuity along any given route.
- (b) Coordination of color schemes with adjacent Districts for interdistrict routes.
- (c) Requests from local organizations oriented toward improvement of aesthetics in their community.

Color selection for steel bridges should be mutually satisfactory to the Division of Structures and the District. The Division of Structures will initiate the color selection process by submitting the proposed color to the District for review. The color for steel sign structures will be selected by the District.

## Topic 706 - Roadside Treatment

### 706.1 Roadside Management

The management of roadsides is to be considered in roadway design. Roadside management is the concept of designing the highway to provide cost effective improvements in consideration of long term maintenance costs. Roadsides should be designed to minimize the frequency and duration of labor intensive maintenance operations, to reduce the exposure of maintenance personnel to traffic, and to assist the Department in meeting environmental goals. Designers should strive to provide transportation improvements that minimize the need for repetitive, ongoing maintenance tasks, or to allow those tasks to be accomplished through automated, or mechanical means. Maintenance tasks that typically require ongoing effort include litter control, vegetation control, graffiti abatement, etc.

Roadway design includes facilities or equipment placed on the roadside that require manual labor to operate or maintain, such features should be located to provide maximum safety for maintenance personnel. It may be necessary and cost effective to shield facilities and equipment, to pave narrow areas or areas under guard rail, or to locate facilities so that access is made from outside the right of way, to accomplish this. The designer should evaluate the potential for distracting the motorist when placing roadside facilities and equipment, especially those that require manual maintenance. Facilities placed out of the motorists sight or those that may be accessed from outside the right of way will reduce the possibility of motorist distraction and will be safer to maintain.

Formal safety reviews should be accomplished as discussed in Section 110.7 for roadside management issues. Consultation with the District Maintenance unit and District Landscape Architect is recommended early in design development to minimize potential roadside management conflicts and to determine roadside needs for future projects. Consultation with these units may also provide information to reduce the potential for redundant placement of roadside facilities.

The following conditions should be considered in roadway design to accommodate long term roadside management:

- Unpaved areas or strips parallel and immediately adjacent to the roadway are often created by the construction of noise barriers or by the placement of solid median barriers beyond the paved inside shoulder edge. These areas create debris traps, require vegetation control and cannot be maintained mechanically. Unpaved strips which are 4.5 m or less in width should be paved to the barrier with minimum structural section to facilitate mechanical maintenance efforts. Full structural sections may be appropriate in some areas. The additional paved areas may be marked, delineated, colored or specially treated to minimize the potential for inappropriate use.
- Unpaved areas with widths greater than 4.5 m may include permanent surfacing alternatives such as soil polymers, binders or decorative paving such as stamped concrete. The planting of low maintenance native grasses and forbes may be appropriate in some non-urban locations. Consult with the District Maintenance unit and the District Landscape Architect for options.
- The designer should strive to minimize the placement of roadside facilities that require intensive long term maintenance efforts. Designs should include low maintenance alternatives to provide a roadside that reduces maintenance costs and increases worker safety.

- Noise barrier projects should include planting of appropriate vines and shrubs to prevent graffiti.
- In narrow rights of way, locating a concrete safety shape barrier one meter from the face of the wall to allow for planting and irrigation facilities within the protected area.
- Gore areas, narrow strips, terminus of ramps, auxiliary lanes and areas with traffic control devices, are inherently areas in which maintenance activity frequency and duration are increased. These areas should be designed in a manner which reduces future maintenance.

### 706.2 Vegetation Control with Soil Sterilants

Vegetation control soil sterilant chemicals may be applied to prevent weed growth through surfaced medians, traffic islands, and other paved areas.

The Division of Maintenance is responsible for specifications for the use of all such herbicides. Approval is required for any changes from the currently approved Standard Specifications and Standard Special Provisions.

Since soil sterilant may be transported by water, they should not be used where they may affect native vegetation, landscape plantings, agricultural crops, adjacent residential, commercial or recreation areas, streams, or bodies of water.

Before specifying soil sterilants, the District Landscape Architect should be consulted to determine the possibility of future planting.

### 706.3 Topsoil

In areas of new construction, where topsoil is of good quality, it should be stockpiled during construction and respread during the final stages of construction. Where natural revegetation is desired, the native brush should be crushed or chipped and mixed with the stockpiled soil. Since topsoil contains beneficial microorganisms and seed, it is best to stockpile it in shallow windrows so that oxygen can penetrate the soil.

### 706.4 Irrigation Crossovers for Highway Construction Projects

Irrigation crossovers normally consists of a conduit with a waterline crossover and sprinkler control conduit with pull wire. Irrigation crossovers should be provided under new roadways and ramps when future highway planting is anticipated. The District Landscape Architect should be consulted to determine the need for such crossovers and specifics such as size and location. Attention should also be given to extending existing conduits when widening or modifying roadways and ramps.

The following factors should be considered in sizing and locating crossovers :

- (a) A standard irrigation crossover consists of a minimum size of 200 mm diameter nominal (DN) conduit, with a 75 mm DN water supply line and a 50 mm DN sprinkler control conduit with pull wire. Sizes of irrigation crossovers and water supply lines are usually larger when nonpotable water is to be used.
- (b) Typically, full freeway irrigation crossovers are spaced 300 m apart where future highway planting is anticipated.
- (c) Undercrossings may be considered alternative crossing opportunities. Drainage facilities should not be used for waterline crossings.

Standard details and special provisions for the irrigation crossover should be furnished by the District Landscape Architect to the Project Engineer for highway construction projects.

### 706.5 Water Supply Line (Bridge) and Sprinkler Control Conduit for Bridge

Water supply line and sprinkler control conduit with pull wire should be provided in new bridge structures.

The District Landscape Architect should be consulted to determine the need for such water supply lines and sprinkler control conduits and other specifics such as size and location.

Attention should also be given to modifying, changing existing or installing new water supply lines and sprinkler control conduits when widening or modifying bridge structures.

The following factors should be considered in sizing and locating water supply lines and sprinkler control conduits:

- (a) Generally, locate on one side of the bridge, the side nearest the water source.
- (b) Consider the maximum water demand and number of irrigation controller stations anticipated to be used. The pipe for the water supply line should be a minimum 75 mm DN and the conduit for the sprinkler control conduit should be a minimum 50 mm DN and contain a pull wire.
- (c) Ductile iron pipe is required for the water supply line for pipes 100 mm DN or larger because of its superior strength and flexible joints.

#### **706.6 Water Supply for Future Roadside Rest Areas, Vista Points, or Planting**

In the preparation of a major highway construction project, consideration should be given to the possibility of using the water source needed for construction as part of a future permanent water supply system. Provision for a permanent water supply should be included in the major construction project. If this appears to be a feasible solution, consider such factors as:

- (a) Probability of a future planting, vista point, or roadside rest project.
- (b) Economy.
- (c) Possible reduction in the flexibility of the highway contractor's operation.

The District Landscape Architect should be consulted.

## **Topic 707 - Slope Treatment Under Structures**

### **707.1 Policy**

Bridge end slope should be treated to:

- (a) Protect slopes.
- (b) Improve aesthetics.
- (c) Reduce long term maintenance costs.

Slopes need to be protected when erosion or high maintenance costs are anticipated. The District will determine where slopes are to be treated and the type of treatment to be used.

Caltrans maintenance, landscape architecture, materials, design, and other interested units will furnish input to determine slope treatment needed at each site. Local agency input should be obtained as necessary for urban undercrossings.

All types of slope treatments require adequate drainage facilities for water from upper roadway. Inadequate drainage is a major source of slope erosion.

### **707.2 Guidelines for Slope Treatment**

- (a) Full slope paving has high initial costs and low long-term maintenance costs. It may be justified where anticipated maintenance costs will be high due to erosion by pedestrians, wind, small amounts of water, or other causes. High landscape maintenance costs caused by inadequate moisture, sunlight, etc., may also justify use of full slope paving in lieu of planting. The District Landscape Architect will provide aesthetic input and locations for waterline crossover conduits under slope paving.
- (b) Landscaped slopes have moderate initial costs and maintenance costs vary with the site. Landscaped bridge end slopes may be justified when adjacent slopes are landscaped and when landscaping is compatible with adjacent development. Conditions must exist where plants would

have a strong likelihood of survival (adequate sunlight, etc.).

- (c) Bare slopes have minimum initial costs and higher maintenance costs which vary with the site. Bare bridge end slopes may be justified at rural sites and other areas where anticipated maintenance activity will be low and there is little likelihood for erosion. Appropriate drainage design is critical when slopes are left bare.
- (d) An analysis of the "life cycle" costs should be made using the method contained in the Structures Value Engineering Report, "Bridge End Slope Treatment," April 1978.
- (e) Adequate drainage facilities must be provided to prevent saturation of abutment foundation materials and damage to slope treatment.
- (f) Additional protection may be required at stream crossings to provide for flow velocity.

### 707.3 Procedure

Based on consultation with the District Landscape Architect and Structures Bridge Architect and in consideration of economic and aesthetic factors, the District will determine, and set forth with the bridge site plan submittal, the type of slope treatment indicating whether:

- (a) The Division of Structures is to design the slope treatment with the bridge and include the cost in the Structure items; or
- (b) The District will design the slope treatment and include the details with the road plans.